Name: Student Number:

CMPT 371.3 FINAL EXAMINATION THREE HOURS

April 17th, 1999

This is a closed book exam. There are four questions worth a total of 180 marks. Answer all questions. Point form answers are acceptable but must be written so that the meaning is as clear as possible. For Question 1, you must write your answers neatly in the space provided on the exam booklet. Use the back of the page if you need more space. Use an answer booklet for the other questions.

Question 1 (90 Marks) Short Questions

Give brief answers to the following 18 questions: (5 marks each).

   a. **Give five reasons why software development is a "wicked" problem.**
   a. **Distinguish between nominal, ordinal and interval scales of measurement and give an example of each from the domain of software.**
   a. **Identify four separate measures of a software project, and describe and explain how they change as project size increases.**
   a. **Give brief definitions of each of the following terms:**

   - Configuration item
   - Software baseline audit
   - Conversion protocol design
   - Slice diagram
   - Interoperability

   a. What is the basic idea of the C.M.M. approach to software quality? List and describe the five levels involved.
   b. Define and justify static program verification.
   c. What are drivers and stubs? When are they needed?
   d. Identify five possible causes of hard-to-find bugs.
   e. Describe one approach to inter-class testing in object-oriented systems.
   f. Distinguish between software reuse and C.O.T.S. How can they be used in developing a new system?
   g. Draw a fishbone diagram to illustrate possible coding errors in a java applet.
   h. Contrast the problems involved in using LOC and FP to estimate the size of a possible software development project. (List three difficulties with each.)
   i. Distinguish between reactive and proactive risk strategies as applied to software development.
   j. What is MTBF? How effective is it as a model of software reliability? Define a measure of software availability.
   k. What are coupling and cohesion? Are they useful concepts in object-oriented software?
   l. List and defend your choices for the five most important principles in designing a web

page.

m. Describe two examples of errors that might pass white box testing but not black box testing, and two that might pass black box testing but not white box testing.

n. Summarize the steps you must go through to use CVS for software configuration management. Explain how CVS works.

Question 2 (30 Marks) Software Project Planning

The table below describes a software project. Each node with a letter represents a state, with the project starting at state A and ending at state L. In some cells three numbers are given. These are estimates of the number of person days of effort needed by the activity required to move from one state (shown in the column on the left hand side) to another states (shown in the column at the top of the table). For example, the first row shows that the project moves from state A to states B, C and E, through three activities. The three numbers represent optimistic, expected and pessimistic estimates of the required effort. For example activity A - B will take at best 2 person days, and at worst 10 person days, but it is expected to date 3 person days.

From	A	B	C	D	E	F	G	H	I	J	K	L
A (start)		2,3,10	3,5,13		3,4,11							
B				4,5,18					4,6,20			
C						2,3,4						
D									1,2,9			
E							2,3,11					
F								1,1,1				
G								2,3,10		1,2,15		
H											3,4,11	
I										1,2,3		
J											5,6,7	7,8,9
K												3,4,11
L (end)												

Required

a. **(10 marks) Draw a project network with nodes as circles representing states and lines as arcs representing activities. Using just the expected (or middle) values, what is total number of person days required to complete the project? Which activities are on the critical path?**

b. **(10 marks) Using all three figures, what is the best estimate of the total number of person days to complete the project? Which activities now form the critical path? Is this the worst possible scenario you would consider in your planning?**

c. **(10 marks) Given the following assumptions:**

- **You have been offered a contract to develop and deliver the software, and will receive $60,000 for it. You will begin work on Monday May 3rd, 1999 and must deliver the product, as per the above network, by the end of Friday May 28th, 1999. If you are late, you must pay a penalty of $30,000.**
- **You can hire any number of software developers and they cost $500 per working day each. However you must hire them for the full four weeks (20 working days)**
- **By agreement, developers do not work on Saturday or Sunday, and do not work overtime. (The person day, costing $500 per day is the only unit of labour.)**

How many developers do you hire? (You must show your calculations, and you may reject the contract if it cannot be profitable.)

Question 3 (30 Marks) Applet Design and Testing

A mathematics teacher wants a means of displaying a simple polynomial equation of the form:

$Y = a + bX + cX^2 + dX^3 + eX^4 + fX^5$ â€¦ etc

A student will enter numbers corresponding to the constants a,b,c etc, and the minimum and maximum values for X. The applet will plot the equation for the range of X from the minimum to the maximum values, adjusting the y axis suitably.

a. **(10 marks) Using some suitable notation, describe how you would implement this as a Java applet in a reasonable but simple manner. Your design must support future changes or extensions to this requirement. Actual Java code is not required or expected. Indicate how you will cope with critical issues that are not spelled out in the requirements, such as the maximum order of the polynomial.**

a. **(10 marks) Describe in detail a test plan, including a test scenario and test cases, for a thorough black box test of this applet.**

a. **(10 marks) The mathematics teacher likes what you have done, but now she wants a simple addition. Instead of entering the constants and seeing what the resulting curve looks like, she wants to be able to change them dynamically via "sliders", and see the resulting changes to the curve. How can you do this?**

Question 4 (30 Marks) Web Page Design and Coding

a. **(10 marks) Given the following five HTML files in one directory, sketch and describe what is displayed when the file "framepage.html" is displayed on a current Netscape browser.**

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TARGET="BODY"></HEAD><FRAMESET ROWS="20%,60%,20*" COLS ="100%">

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MARGINHEIGHT="14">

<FRAMESET COLS="30%, 1*">

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MARGINHEIGHT="14">

<FRAME NAME="BODY" SRC="frame3.html" MARGINWIDTH="10"
MARGINHEIGHT="14">

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<FRAMESET ROWS="100%" COLS="100%" >

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MARGINHEIGHT="14" bgcolor=green>

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<BODY>

<P>Viewing this page requires a browser capable of displaying
frames.</P>

</NOFRAMES>

</BODY></HTML>
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File: frame1.html<HTML><HEAD><TITLE>Class</TITLE></HEAD><BODY bgcolor=green><FONT
SIZE=+3>CMPT 371 - </FONT><FONT SIZE=+2>Systems Design, Implementation and
Maintenance</FONT></BODY></HTML>

File: frame2.html<HTML><HEAD><TITLE>First</TITLE></HEAD><BODY bgcolor="red">John Cooke -
Professor</BODY></HTML>

File: frame3.html

<HTML><HEAD><TITLE>Second</TITLE></HEAD><BODY bgcolor="yellow">Lori Kettel -
Instructor</BODY></HTML>

File: frame4.html<HTML><HEAD><TITLE>Third</TITLE></HEAD><BODY>Margaret Tang -
Marker</BODY></HTML>

Question 4, Part b (10 marks) Given the following file, sketch and describe what is
seen when it is displayed on a current Netscape browser.

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<FONT FACE="ARIAL, GENEVA, SANS-SERIF">

<CENTER><FONT SIZE=+2><B>THIS EXAM QUESTION IS ABOUT HTML TABLES</B></FONT></FONT>

<P><IMG SRC="PRETTY.FLOWER.GIF" ALT="A Pretty Flower'" HEIGHT=72 WIDTH="460"
ALIGN=BOTTOM><BR></CENTER>

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<B><FONT FACE="VERDANA, SANS-SERIF">

<FONT COLOR="blue">Final Exam 1999</FONT></FONT></B></TD>

<TD ALIGN=CENTER VALIGN=TOP COLSPAN=2>

<B><FONT FACE="VERDANA, SANS-SERIF">

<FONT COLOR="blue">Have Fun</FONT></FONT></B></TD></TR>

</TABLE>

<HR SIZE="8" NOSHADE WIDTH="100%"></TD></TR>

<TR><TD ALIGN=LEFT VALIGN=TOP ROWSPAN="3" WIDTH="125" BGCOLOR="white">

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<B><FONT FACE="ARIAL, SANS-SERIF"><FONT
COLOR="black">Exams</FONT></FONT></B></TD></TR>

<TR><TD ALIGN=LEFT COLSPAN="2" >

<B><FONT FACE="TIMES, SERIF">Are Never Fun :-(</FONT></B></TD></TR>

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<BR></TD></TR>

<TR><TD VALIGN=TOP WIDTH="35%" HEIGHT="100%">

<B><FONT FACE="ARIAL, SANS-SERIF"><FONT SIZE=+2>What's New?? </FONT></FONT></B>

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</TABLE></TD>

<TD VALIGN=TOP COLSPAN=2>

<B><FONT FACE="TIMES, SERIF"><FONT SIZE=+2>Yet More
Words</FONT></FONT></B></TD></TR><TR><TD VALIGN=TOP COLSPAN="3"><FONT
SIZE=+2><B>THE END</B></FONT></TD></TR>

</TABLE>

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Question 4, Part c) (10 Marks) Compare and contrast the advantages and disadvantages of using frames versus tables in web site development.

THE END

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